

Please replace the abstract beginning on page 20 with the following replacement abstract:

ABSTRACT

A first series of operations, for implementation on a quantum computing device is obtained. Quantum interaction between qubits in the plurality of qubits is limited to nearest-neighbor coupling. The first series of operations designates a plurality of operations and, for each respective operation in the plurality of operations, a time step in which the respective operation is implemented. The first series of operations collectively implements a quantum calculation. A second series of operations is derived from the first series of operations by changing an execution order of a first and second operation in the plurality of operations. The second series of operations is for implementing the quantum calculation on the quantum computing device. The first and second operations commute, thereby causing a time required for the quantum computing device to complete the second series of operations to be less than a time required to complete the first series of operations.